

**Secretary's Council on Public Health  
Preparedness**

**The NIH Biodefense  
Research Agenda:  
A Progress Report**

**Anthony S. Fauci, M.D.**

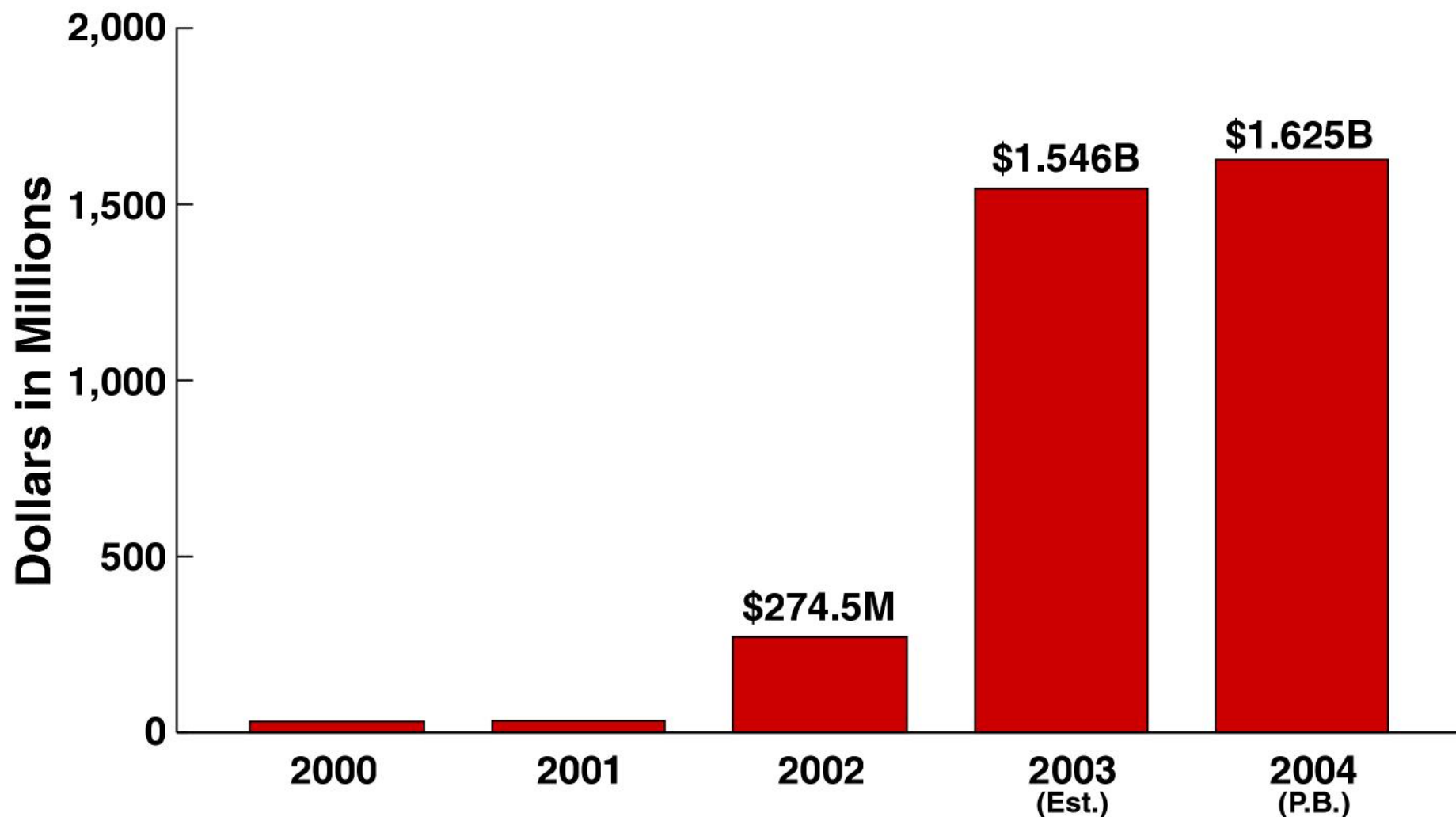
**Director**

**National Institute of Allergy and  
Infectious Diseases  
September 23, 2003**



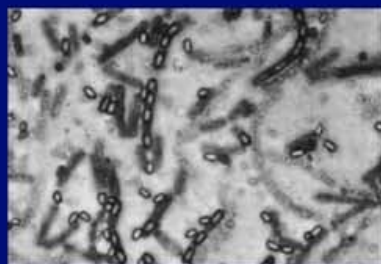
# NIH Biodefense Research Funding, FY 2000-2004

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February 2002

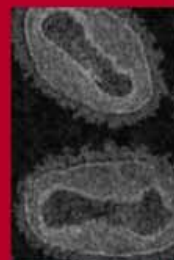
## NIAID Strategic Plan for Biodefense Research



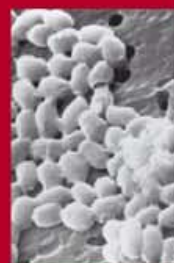
National Institute of Allergy and Infectious Diseases  
NATIONAL INSTITUTES OF HEALTH

February 2002

## NIAID Biodefense Research Agenda for CDC Category A Agents



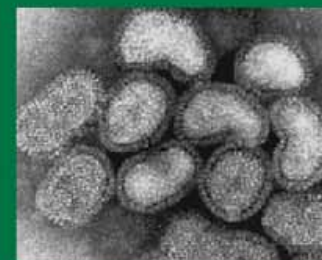
Responding  
Through  
Research



National Institute of Allergy and Infectious Diseases  
NATIONAL INSTITUTES OF HEALTH

January 2003

## The NIAID Biodefense Research Agenda for Category B and C Priority Pathogens



Responding  
Through  
Research



NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES



National Institute of Allergy and Infectious Diseases  
NATIONAL INSTITUTES OF HEALTH

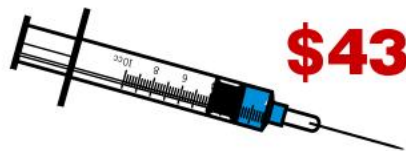
<http://biodefense.niaid.nih.gov>





**Therapeutics**

**\$82M**



**\$437M**

**Vaccines**

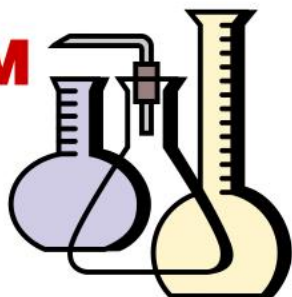


**Diagnostics**

**\$26M**

**Biodefense  
Research  
Priorities**

**\$258M**



**Basic Research  
(including Genomics)**

**Fiscal Year  
2003  
Total: \$1.546B  
(est.)**

**\$743M**



**Expansion of  
Research Capacity**

20 February 2003

International weekly journal of science

nature



£7.00

[www.nature.com/nature](http://www.nature.com/nature)

**Countering bioterrorism**

Roles of scientists  
and journals

**Multicolour displays**

Going organic



**Commentary**

# **Biodefense on the Research Agenda**

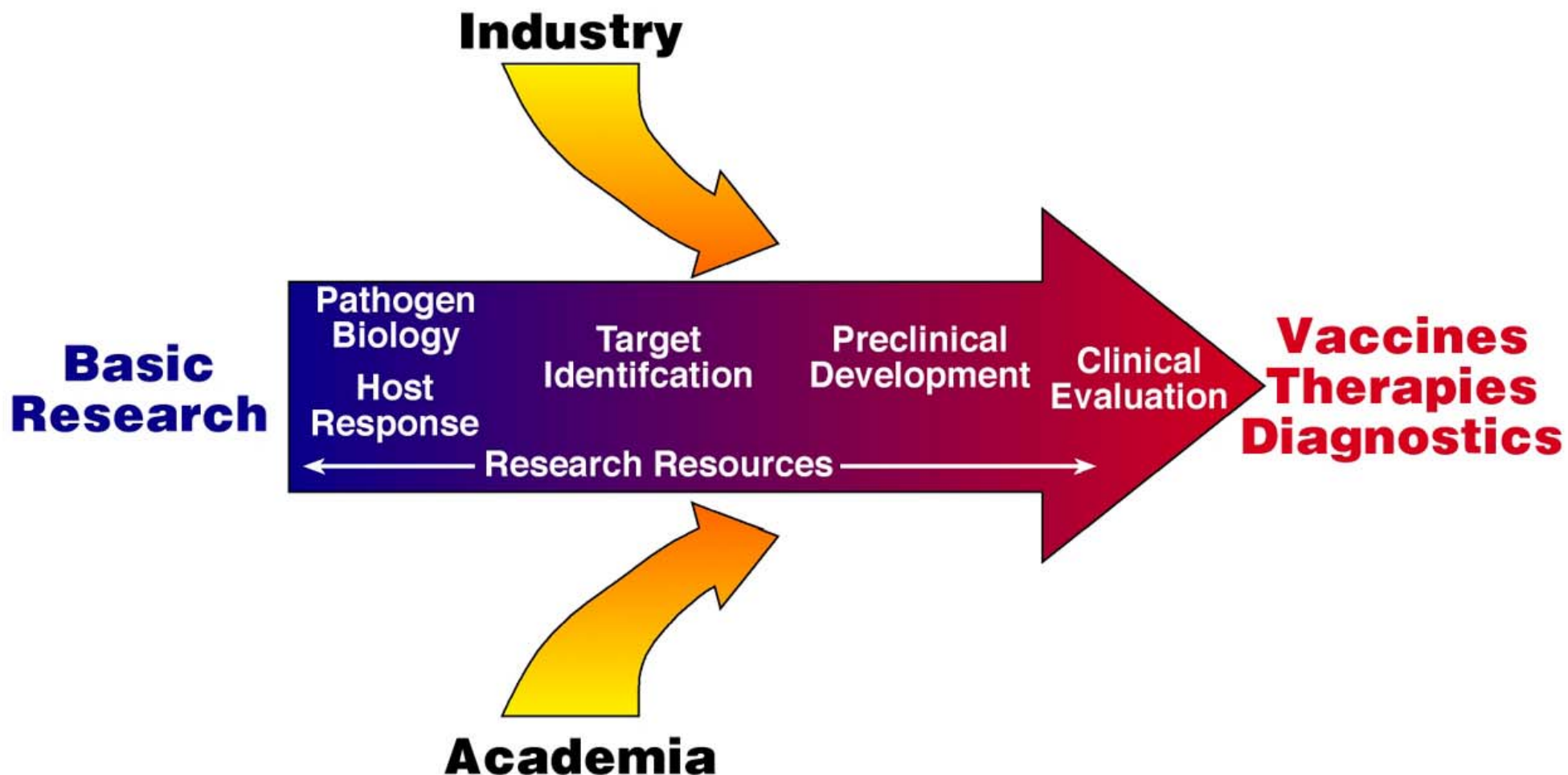
**The world needs new and creative ways  
to counter bioterrorism**

**Anthony S. Fauci**

**naturejobs** on the forensic trail

# NIH Biodefense Research Pathway

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# NIAID Biodefense Research Agenda for CDC Category A Agents

Progress Report, July 2003



U. S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
National Institutes of Health  
National Institute of Allergy and Infectious Diseases

<http://biodefense.niaid.nih.gov>



# **NIAID Biodefense Progress Report, September 2003**

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- **>50 major initiatives to stimulate biodefense research in FY 2002 and FY 2003**
- **Multiple collaborators with industry and academia**
- **Substantial progress in meeting all the specific goals and recommendations of Blue Ribbon Panel (Feb. 2002)**
  - **Expansion of research capacity**
  - **Advancement of basic research into priority pathogen and host responses**
  - **Development of counter measures**



# Countermeasure Development

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## ■ Immediate

- Smallpox vaccine dilution studies
- rPA anthrax vaccine
- MVA smallpox vaccine
- Ebola vaccine
- Botulinum toxin-human monoclonal antibodies

## ■ Intermediate

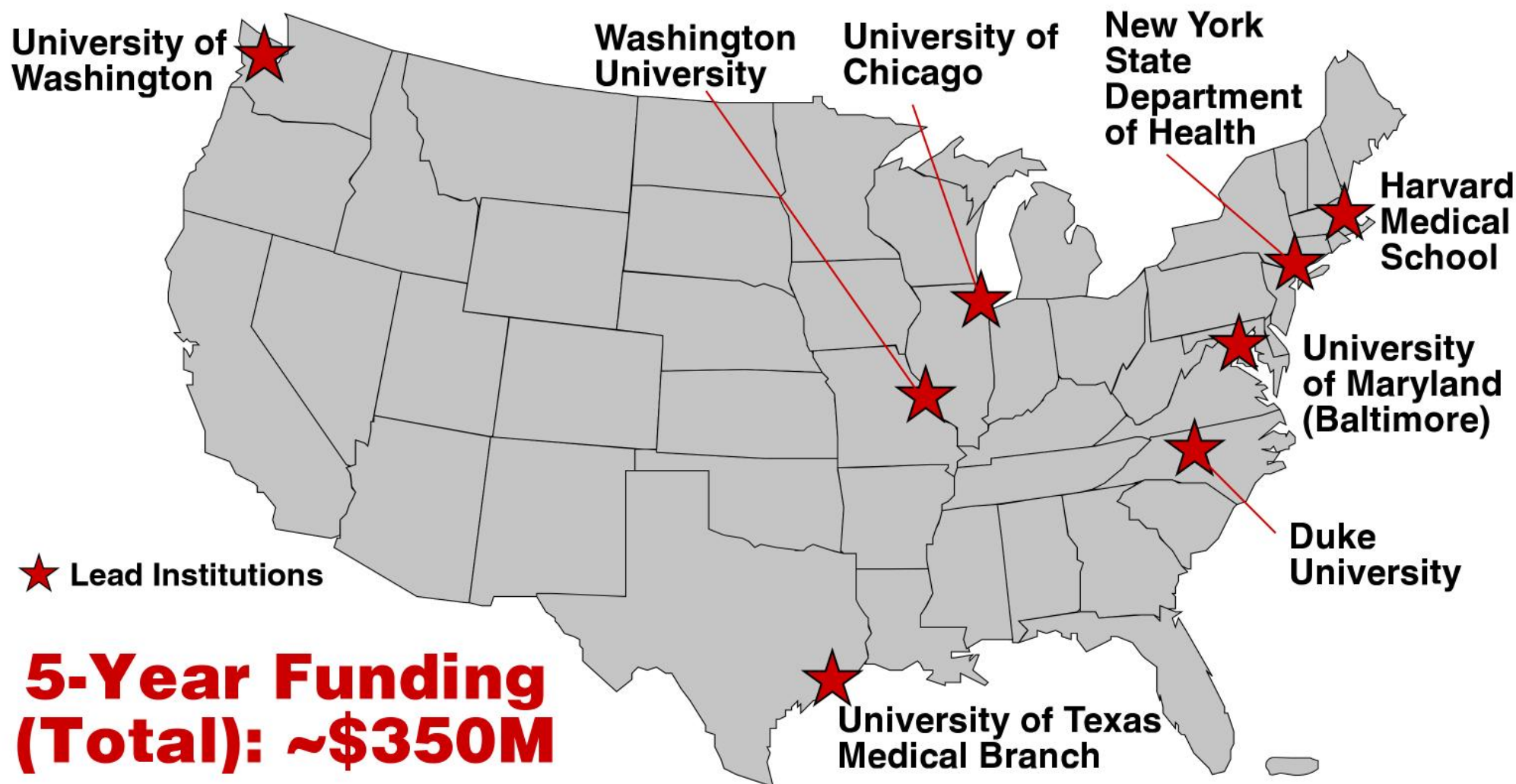
- Smallpox therapeutics
- Plague vaccine
- Tularemia vaccine
- Botulinum toxin vaccine

## ■ Long-term

- Universal antibiotics and vaccines

# NIAID Regional Centers of Excellence for Biodefense and Emerging Infectious Diseases Research (RCEs)

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# **NIAID Regional Centers of Excellence (RCEs)**

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- **Basic research to understand category A, B, and C agents**
- **Interdisciplinary research**
- **Translational research leading to the identification of new drugs, vaccines and diagnostics**
- **Training of new researchers**
- **Developmental research projects**
- **Research for National emergency responders**

# **Construction and Renovation of BSL-3 and BSL-4 Facilities to Enable Safe Research On Agents of Bioterrorism**

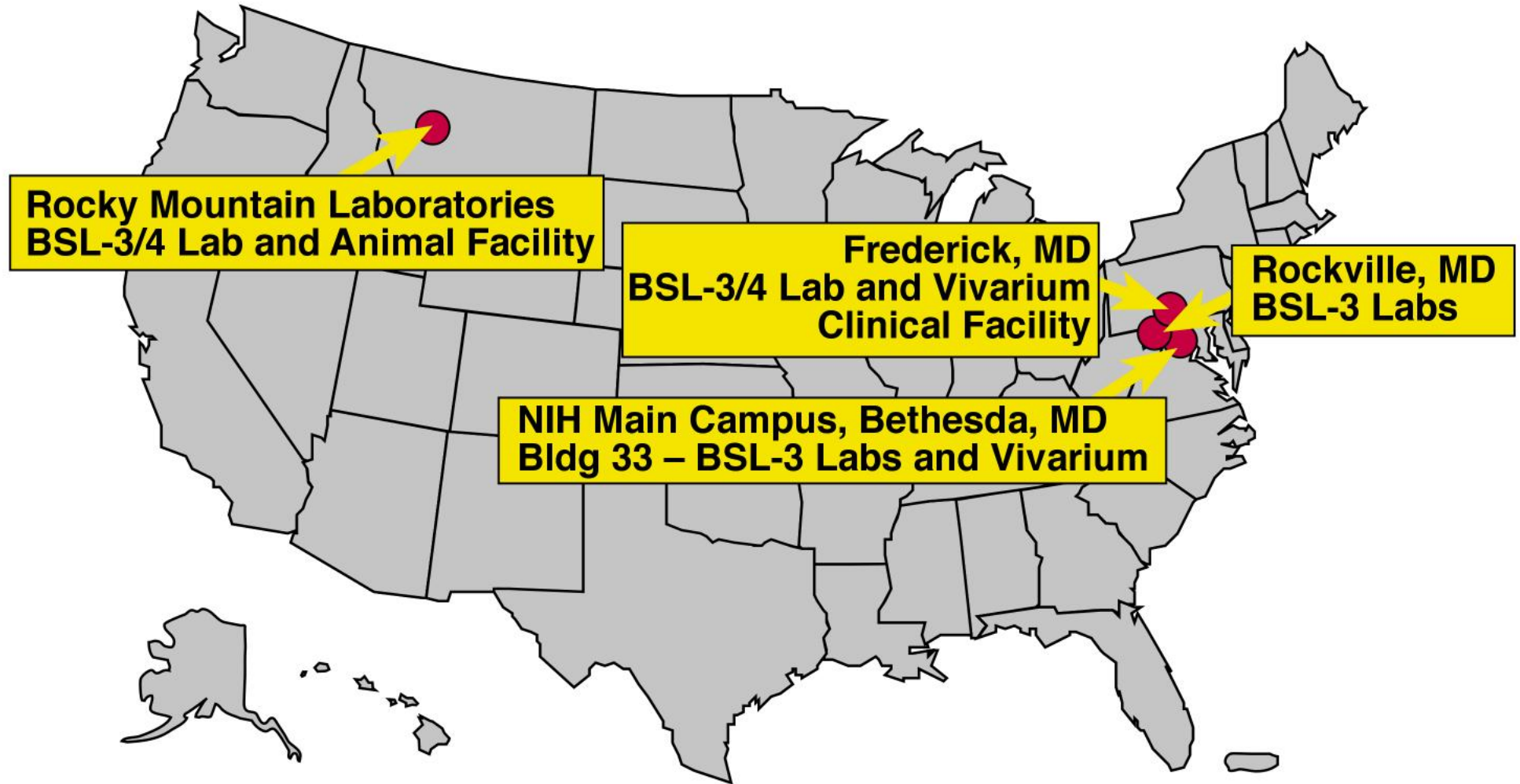
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- **National Biocontainment Laboratories (NBLs)**
  - BSL-4
  - 2 awards (\$125-150M each for FY 03) to be announced ~Sept. 30, 2003
- **Regional Biocotainment Laboratories (RBLs)**
  - BSL-3
  - 9 awards (\$100 million total for FY03) to be announced ~Sept. 30, 2003
- **Intramural Laboratories**
  - BSL-3 and BSL-3/4



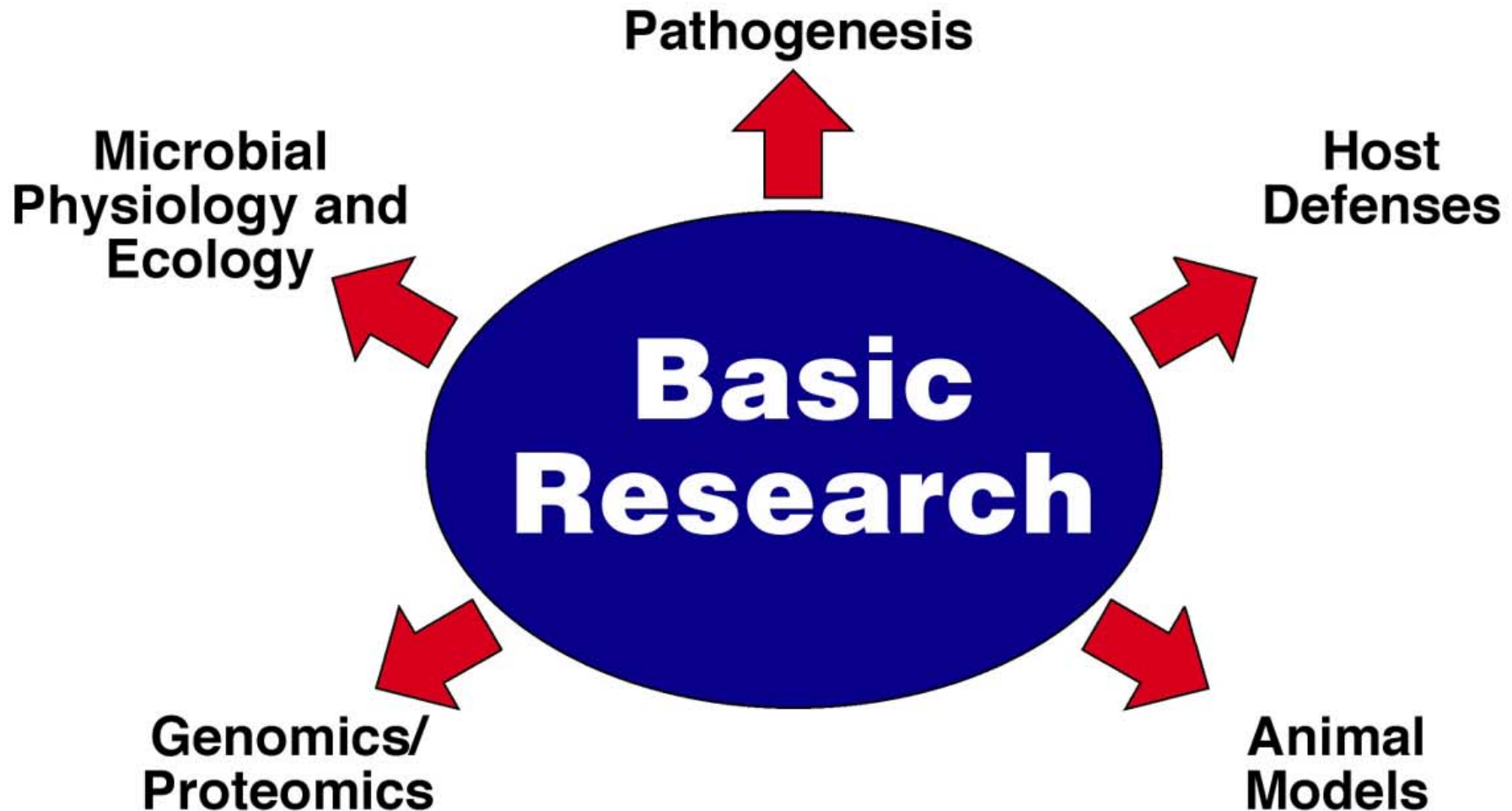
# **New NIAID Facilities to Study Agents of Bioterrorism and Emerging Diseases**

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# Basic Research in Biodefense: Progress and Priorities

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# **Bacillus Anthracis Lethal Toxin Induces TNF- $\alpha$ -independent Hypoxia-mediated Toxicity in Mice**

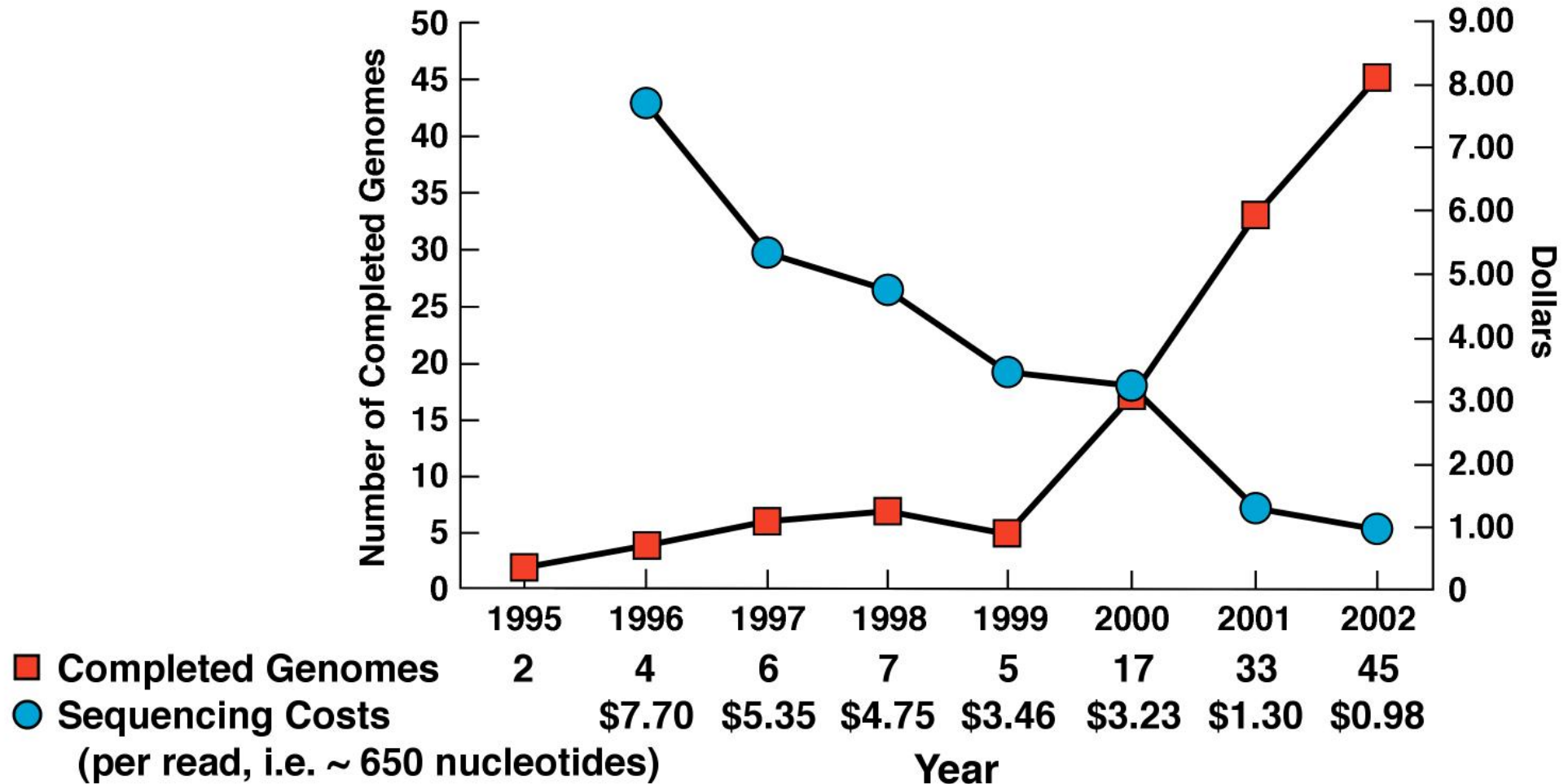
**M Moayeri, D Haines , HA Young, and SH Leppla**

**"The evidence presented shows that LT kills mice through a TNF- $\alpha$ -independent, FasL-independent, noninflammatory mechanism that involves hypoxic tissue injury but does not require macrophage sensitivity to toxin."**



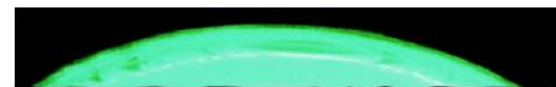


# Completed Microbial Genomes/Cost of Sequencing



Source: M. Giovanni, C. Venter, C. Fraser





# Genome Sequence of *Yersinia pestis*

Wen Deng et al.

August 2002  
Volume 184  
Issue 16

# JB

Journal of Bacteriology

May 21, 2003

# PNAS

## Complete Genome Sequence of the Q- Fever Pathogen *Coxiella burnetii*

R Seshadri et al

1 May 2003

International weekly journal of science

# nature

#10.00

www.nature.com/nature

## The Genome Sequence of *Bacillus anthracis* Ames and Comparison to Closely Related Bacteria

TD Read et al

Double life of magnesium diboride

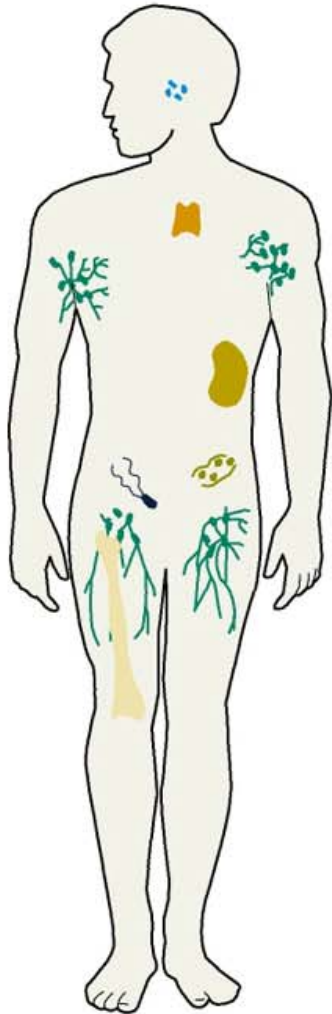
**Anthrax bacillus**

Genome sequence and virulence

naturejobs postdocsunited

# **Biodefense Progress and Priorities: Immunology/ Host Response**

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- **Innate immunity**
- **Adaptive immunity**
- **Immunotherapy**
- **Vaccinology**
- **Mapping of protective epitopes**



# NIAID NEWS

Office of  
Communications  
and Public Liaison

National Institute of Allergy and Infectious Diseases

▪ National Institutes of Health

FOR RELEASE Wednesday, January 8, 2003

## **Powerful Technologies Probe Innate Immunity**

- **\$24 million/5 years**
- **Scripps Research Institute; Institute for Systems Biology; Rockefeller University**
- **Systems biology approach to understanding innate immunity: mathematics, computer modeling, new techniques of gene and protein analysis**
- **Goal: develop an “encyclopedia” of innate immune system activity to inform discovery of interventions against potential agents of bioterrorism, other infectious diseases, immune-mediated diseases**





Wednesday, September 17, 2003

## **\$85 Million Awarded For Research on Human Immunity and Biodefense**

A better understanding of the human immune response to potential agents of bioterror and rapid development of countermeasures such as vaccines and therapies are among the objectives of a new program announced today by the National Institute of Allergy and Infectious Diseases (NIAID), one of the National Institutes of Health (NIH). "NIH is dedicated to supporting research that will help in fighting the war on terror," says NIH Director Elias A. Zerhouni, M.D.

NIAID has named five Cooperative Centers for Translational Research on Human Immunology and Biodefense. Approximately \$85 million over four-and-a-half years will support research at

- Baylor Research Institute (Dallas, TX)
- Dana-Farber Cancer Institute (Boston, MA)
- Emory University School of Medicine (Atlanta, GA)
- Stanford University School of Medicine (Stanford, CA)
- University of Massachusetts Medical School (Worcester, MA)



# Biodefense Vaccine Research: Goals

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- **Protect all groups of civilians**
- **Develop improved vaccines against microbes for which vaccines currently exist**
- **Develop new/novel vaccines against microbes for which none currently exist**



# NIAID Dale and Betty Bumpers Vaccine Research Center

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- HIV
- Smallpox (MVA)
- Hemorrhagic Fever Viruses
  - Ebola, others
- West Nile Virus
- SARS



Basic Research



Clinical Trials

**FY 2003 Budget  
\$81.5M (est)**



7 August 2003

International weekly journal of science

# nature



\$10.00

[www.nature.com/nature](http://www.nature.com/nature)

## **Accelerated vaccination for Ebola virus haemorrhagic fever in non-human primates**

Nancy J. Sullivan, Thomas W. Geisbert, Joan B. Geisbert,  
Ling Xu, Zhi-yong Yang, Mario Roederer, Richard A.  
Koup, Peter B. Jahrling and Gary J. Nabel





FOR IMMEDIATE RELEASE

Thursday, October 3, 2002

## **HHS Announces Contracts for Developing a New Anthrax Vaccine**

HHS Secretary Tommy G. Thompson today announced that the National Institute of Allergy and Infectious Diseases (NIAID) has awarded two companies contracts designed to spur development of a new anthrax vaccine.

"There is an urgent need to devise more effective measures to protect U.S. citizens from the harmful effects of anthrax spores used as instruments of terror," said Secretary Thompson. "These awards represent the first step toward our goal of securing an initial 25 million doses of an improved anthrax vaccine for our emergency stockpile."

# **Development of Highly Attenuated Smallpox Vaccines**

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## **Modified Vaccinia Ankara (MVA)**

- Historically, good safety profile in >100,000 people, including at-risk groups
- Priority of NIAID extramural and intramural programs
- Phase I study recently began at NIAID Vaccine Research Center (n=105)

## **LC16m8**

- Lister strain-derived
- Good safety profile in >50,000 Japanese children



FOR IMMEDIATE RELEASE

February 25, 2003

## **HHS Announces Contracts To Develop Safer Smallpox Vaccines**

HHS Secretary Tommy G. Thompson today announced the award of two contracts totaling up to \$20 million in first-year funding to develop safer smallpox vaccines. The three-year contracts were awarded to Bavarian Nordic A/S of Copenhagen, Denmark, and Acambis Inc. of Cambridge, Mass. The National Institute of Allergy and Infectious Diseases (NIAID) will administer the contracts.



# **Biodefense Therapeutics Research: Progress and Priorities**

**Screening**

**New Targets**



**Drug  
Resistance**

**Broad-Spectrum  
Therapies**

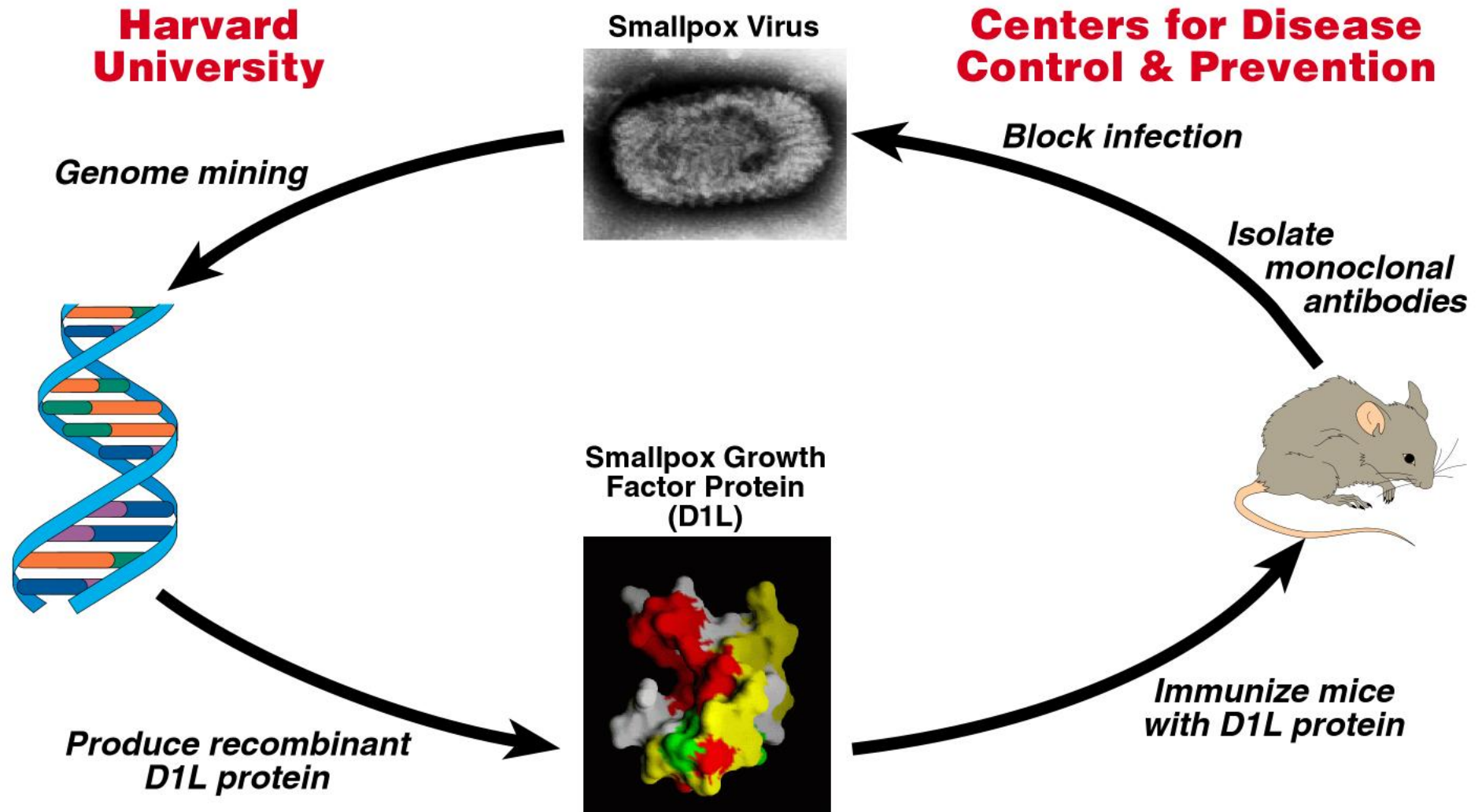
# **Botulinum Antibodies/Antitoxins: Development and Acquisition Plan**

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- **Currently available immune globulin**
- **Plasma available for processing**
- **New horse immunization program**
- **Monoclonal/polyclonal antibodies**

# From Basic Science to Product Development

## Smallpox-Neutralizing Monoclonal Antibodies

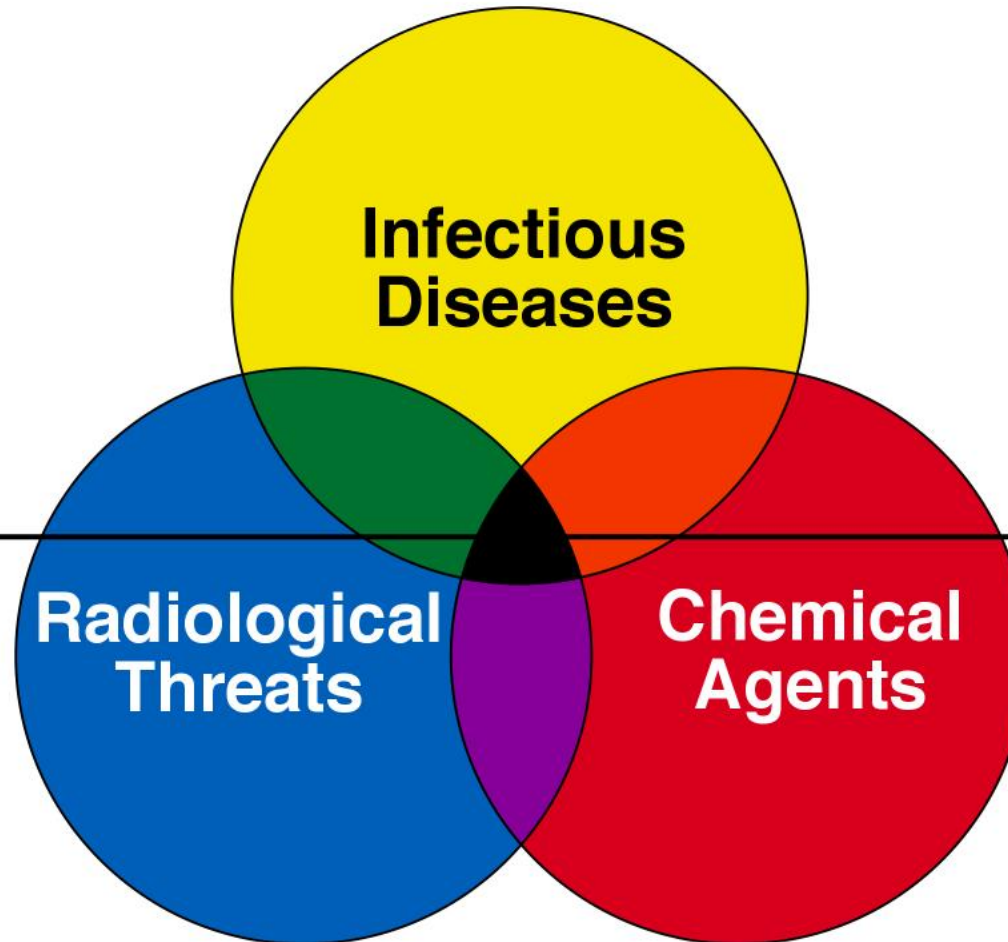




# A Comprehensive Biodefense Research Agenda

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**NIH**



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**DHS  
EPA  
DOE  
DoD  
FDA  
USDA  
etc.**